

Particulate Matter Measurements in a Diesel Engine Exhaust by Laser-Induced Incandescence and the Standard Gravimetric Procedure

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ABSTRACT

Laser-induced incandescence has emerged as a promising technique for measuring spatially and temporally resolved particulate volume fraction and size. Laser-induced incandescence has orders of magnitude more sensitivity than the gravimetric technique, and thus offers the promise of real-time measurements and adds the increasingly desirable size and morphology information. Particulate matter emissions have been measured by laser-induced incandescence and the standard gravimetric procedure in a mini dilution tunnel connected to the exhaust of a single-cylinder diesel engine. The engine used in this study incorporates features of contemporary medium- to heavy-duty diesel engines and is tuned to meet the U.S. EPA 1994 emission standards. The engine experiments have been run using the AVL 8-mode steady-state simulation of the U.S. EPA heavy-duty transient test procedure. Results of the measurements using the two methods are compared and the suitability of the laser-induced incandescence for particulate mass measurements in diesel exhaust is demonstrated.